



ORDER NO. RD-634

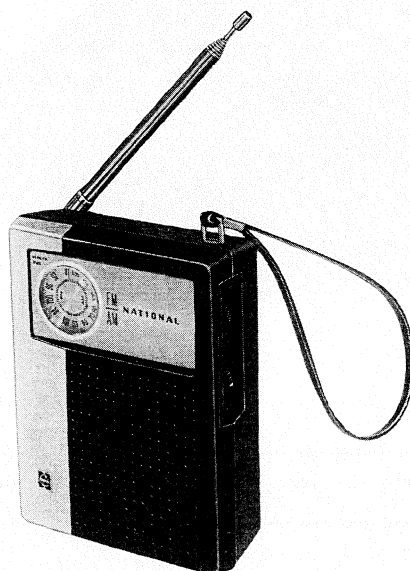


# NATIONAL PANASONIC

## Service Manual

### FM-AM PORTABLE RADIO

MODEL **RF-619**



#### SPECIFICATIONS

Frequency Range :	FM 87~108 MHz AM 525~1605 kHz (571~187m)
Intermediate Frequency :	FM 10.7 MHz AM 455 kHz
Transistors :	2SC920 FM RF Amplifier 2SC920 FM Converter 2SC920 FM 1st IF Amp. & AM Converter 2SC829 FM 2nd IF Amp. & AM 1st IF Amp. 2SC829 FM 3rd IF Amp. & AM 2nd IF Amp. 2SB173/2SB111 1st AF Amplifier 2SB171/2SB111 2nd AF Amplifier 2SB176/2SB117 } Power Amplifier (push-pull) 2SB176/2SB117 }
Diodes :	OA90/1N34A } FM Detector OA90/1N34A } OA90/1N34A AM Detector & AGC OA90/1N34A FM D. AGC
Sensitivity :	FM 5 $\mu$ V for 50mW Output AM 100 $\mu$ V/m for 50mW Output
Power Output :	250mW Maximum
Battery :	9V Battery (NATIONAL 006P or equivalent)
Speaker :	6cm (2 $\frac{1}{4}$ " ) PM Dynamic Speaker, Imp. 8 $\Omega$
Cabinet Dimensions :	85 (Wide) $\times$ 115 (High) $\times$ 38 (Deep) mm (3 $\frac{11}{32}$ " $\times$ 4 $\frac{17}{32}$ " $\times$ 1 $\frac{1}{2}$ " )
Weight :	320g. (11 $\frac{1}{2}$ oz.) without battery

<EXPORT DIVISION>

**MATSUSHITA ELECTRIC TRADING CO., LTD.**  
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**MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.**  
RADIO and STEREO DIVISION

# MODEL RF-619

## To Remove Chassis (Refer to Fig. 1)

1. Remove cabinet back cover.
2. Press spring in the direction of an arrow as illustrated in Fig. 1 and lift chassis.
3. To remove chassis completely, unsolder leadwires to speaker & P.C. board terminal.
4. To reassemble, reverse the above procedure.

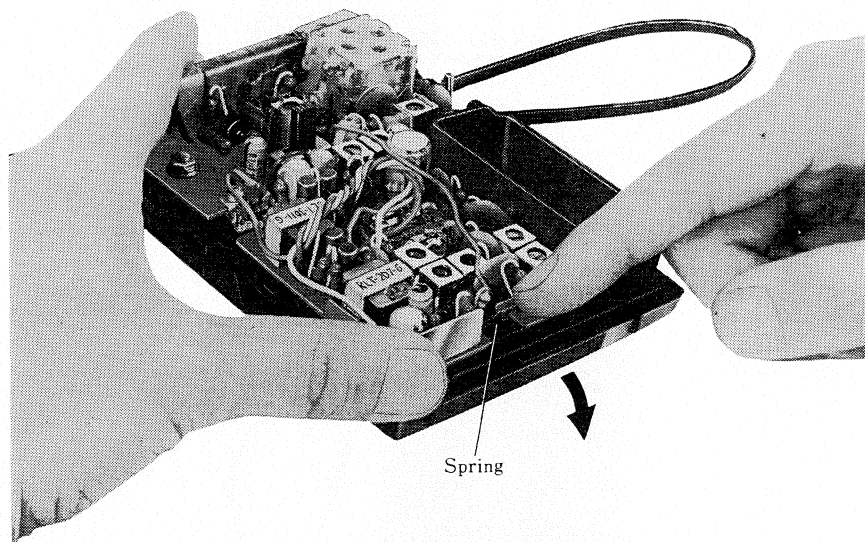
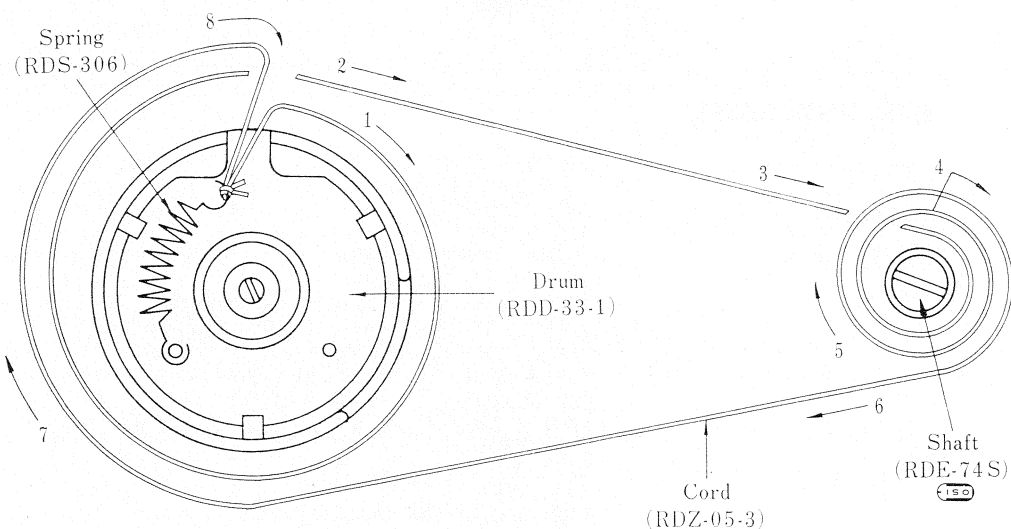


Fig. 1 Top View—Disassembly Points



### Notes:

1. Dial cord length is 50cm (20").
2. Remove dial scale in the direction of an arrow as illustrated in Fig. A.
3. Tuning gang is positioned at maximum capacity.
4. Arrow marks (1~8) indicate correct order and direction of stringing dial cord.
5. Cement dial cord ends.

Fig. A

Fig. 2 Dial Cord Stringing Guide

ALIGNMENT INSTRUCTIONS

AM IF & RF ALIGNMENT

Output of signal generator should be no higher than necessary to obtain an output reading. Set volume control to maximum. Set band selector switch to AM. Set power source voltage to 9 volts DC.						
	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	INDICATOR	ADJUSTMENT	REMARKS
1	Fashion loop of several turns of wire and radiate signal into loop of receiver.	455 kHz (1000~ Mod.)	Point of non-interference (on/about 600 kHz)	Output meter across earphone jack (Load 8Ω)	T <sub>2</sub> (1st IFT) T <sub>4</sub> (2nd IFT) T <sub>8</sub> (3rd IFT)	Adjust for maximum output.
2	"	520 kHz (1000~ Mod.)	Tuning gang fully closed	"	L <sub>9</sub> (OSC Coil)	"
3	"	1650 kHz (1000~ Mod.)	Tuning gang fully open.	"	C <sub>23</sub> (OSC Trimmer)	"
4	"	550 kHz (1000~ Mod.)	Tune to signal	"	L <sub>8</sub> (ANT Coil)	Adjust for maximum output by sliding coil (L <sub>8</sub> ) along ferrite core.
5	"	1500 kHz (1000~ Mod.)	Tune to signal	"	C <sub>18</sub> (ANT Trimmer)	Adjust for maximum output. Repeat steps 2 through 5.

**Note:** Cement antenna bobbin with wax after completing alignment.

FM IF & DETECTOR ALIGNMENT WITH OSCILLOSCOPE

# OSCILLOSCOPE

Set sweep selector of oscilloscope to "External Sweep". Apply 60 Hz sweep signal from sweep generator to horizontal input terminals of oscilloscope.

## EQUIPMENT REQUIRED

Signal generator that provides 10.7 MHz marker.  
 Sweep generator that provides 10.7 MHz center frequency and 400 kHz sweep width.  
 Set band selector switch to FM.  
 Set volume control to minimum.  
 Set power source voltage to 9 volts DC.

**Note:** When step 1 alignment, unsolder lead between test point **TP**<sub>3</sub> and point **A** before alignment and resolder it after alignment.

	SWEEP GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	INDICATOR	ADJUSTMENT	REMARKS
1	High side thru. .001μF to point <b>TP</b> <sub>2</sub> . Common to point <b>TP</b> <sub>5</sub> .	High side thru. .001μF to point <b>TP</b> <sub>2</sub> . Common to point <b>TP</b> <sub>5</sub> .	Point of non-interference. (on/about 90 MHz).	Connect vert. Amp. of scope to point <b>TP</b> <sub>3</sub> . Common to point <b>TP</b> <sub>5</sub> .	T <sub>1</sub> (FM 1st IFT) T <sub>3</sub> (FM 2nd IFT) T <sub>5</sub> (FM 3rd IFT) T <sub>6</sub> (FM 4th IFT) (Primary)	Adjust for maximum amplitude and proper linearity between ±100 kHz markers. (Refer to Fig. 3)
2	"	"	"	Connect vert. Amp. of scope to point <b>TP</b> <sub>4</sub> . Common to point <b>TP</b> <sub>5</sub> .	T <sub>7</sub> (FM 4th IFT) (Secondary)	Adjust <b>T</b> <sub>7</sub> so that 10.7 MHz marker appears the center. (Refer to Fig. 4)

**Note:** When aligning the Ratio Detector circuit, the wave form may appear as in Figs. 3 & 4 or upside-down.

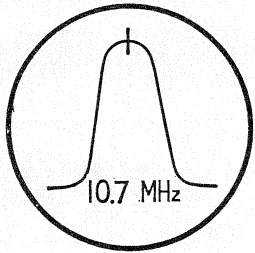


Fig. 3

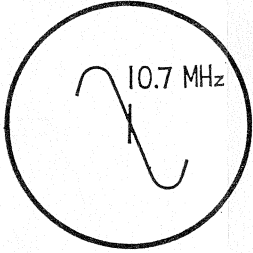


Fig. 4

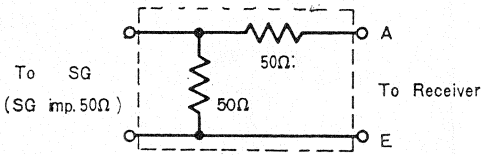


Fig. 5 FM Dummy Antenna

FM RF ALIGNMENT

Output of signal generator should be no higher than necessary to obtain an output reading. Set volume control to maximum. Set band selector switch to FM. Set power source voltage to 9 volts DC.						
	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	INDICATOR	ADJUSTMENT	REMARKS
1	Connect test point to <b>TP</b> <sub>1</sub> through FM Dummy antenna. Common to point <b>TP</b> <sub>5</sub> . (Refer to Fig. 6)	85.5 MHz (1000~ Mod.)	Tuning gang fully closed.	Output meter across earphone jack. (Load 8Ω)	L <sub>7</sub> (FM OSC Coil)	Adjust for maximum output.
2	“	109.5 MHz (1000~ Mod.)	Tuning gang fully open.	“	C <sub>14</sub> (FM OSC Trimmer)	“
3	“	90 MHz (1000~ Mod.)	Tune to signal	“	L <sub>5</sub> (FM Collector Trimmer)	“
4	“	106 MHz (1000~ Mod.)	Tune to signal	“	C <sub>6</sub> (FM Collector Trimmer)	Adjust for maximum output. Repeat steps 1 through 4.

**Note:** As three output responses will be present, proper tuning is the center frequency.

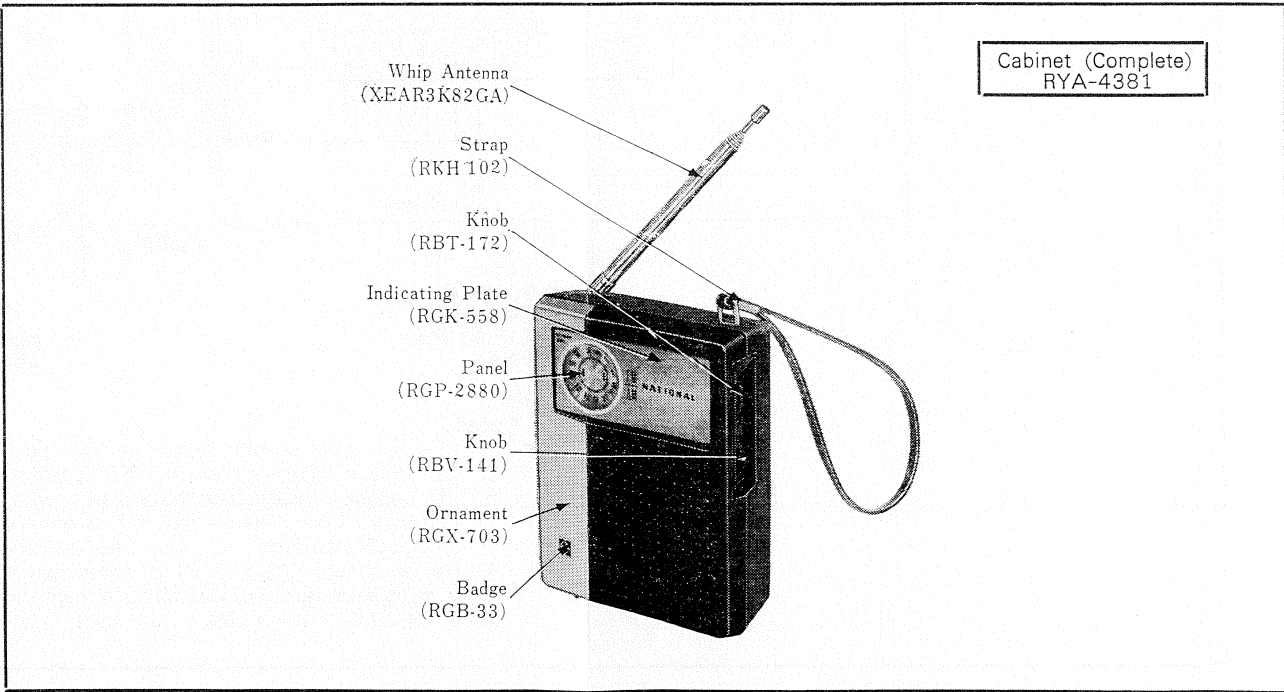


Fig. 6 Cabinet & Appearance—Parts Identification

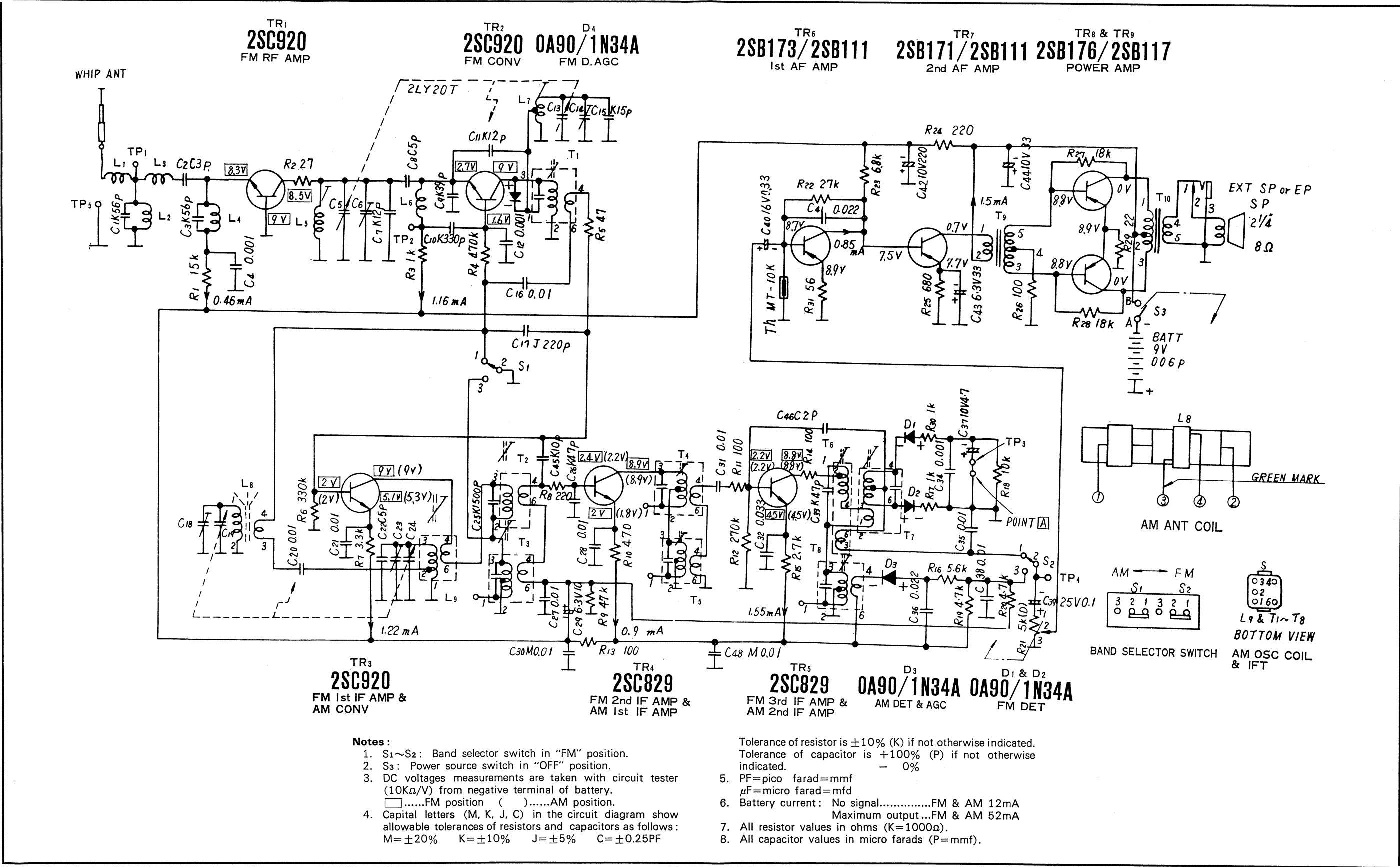
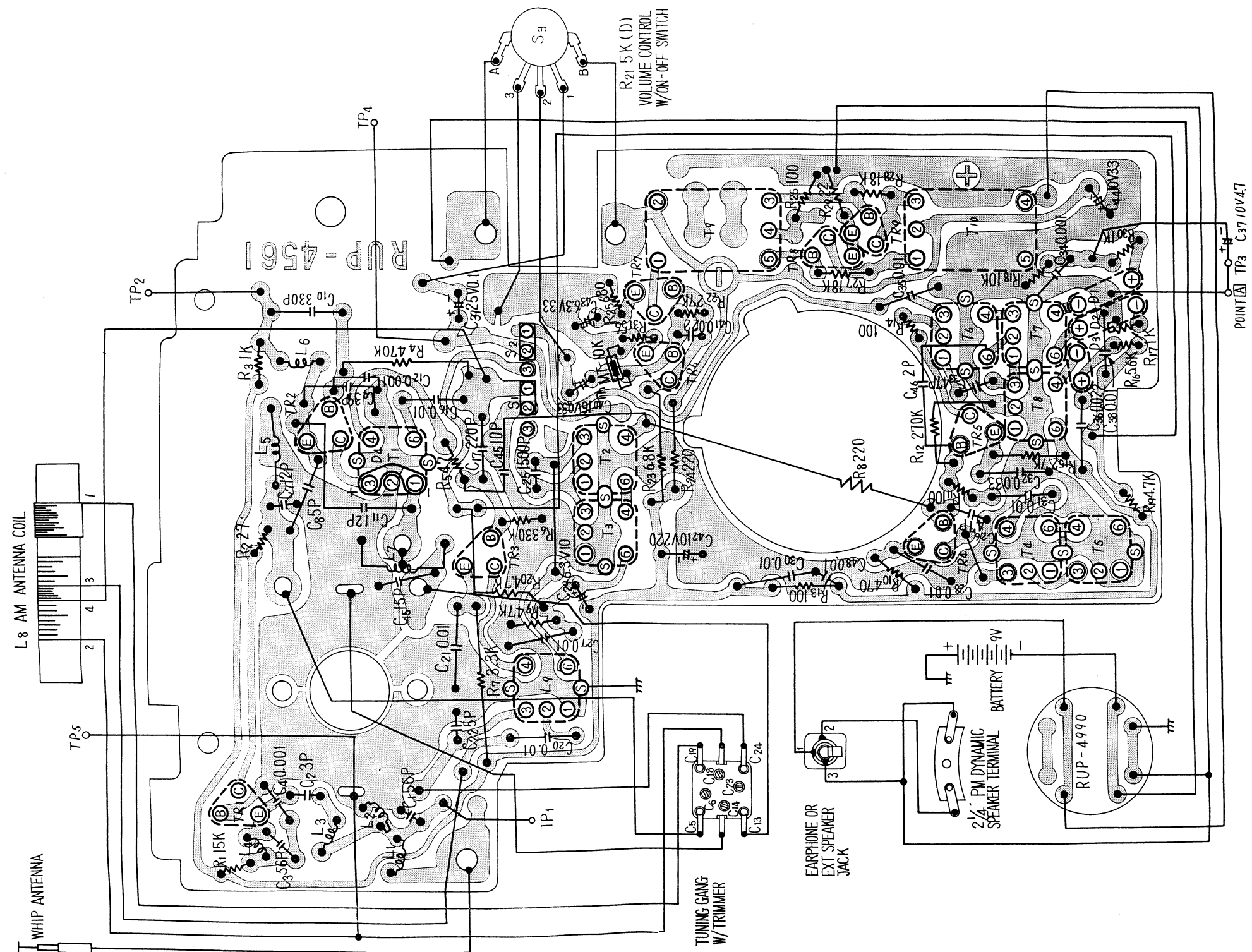


Fig. 7 Schematic Diagram



**Notes:**

1. All resistor values in ohms (K=1000 $\Omega$ ).
2. All capacitor values in micro farads (P=mmf).

Fig. 8 Circuit Board Wiring View (Conductor Side)

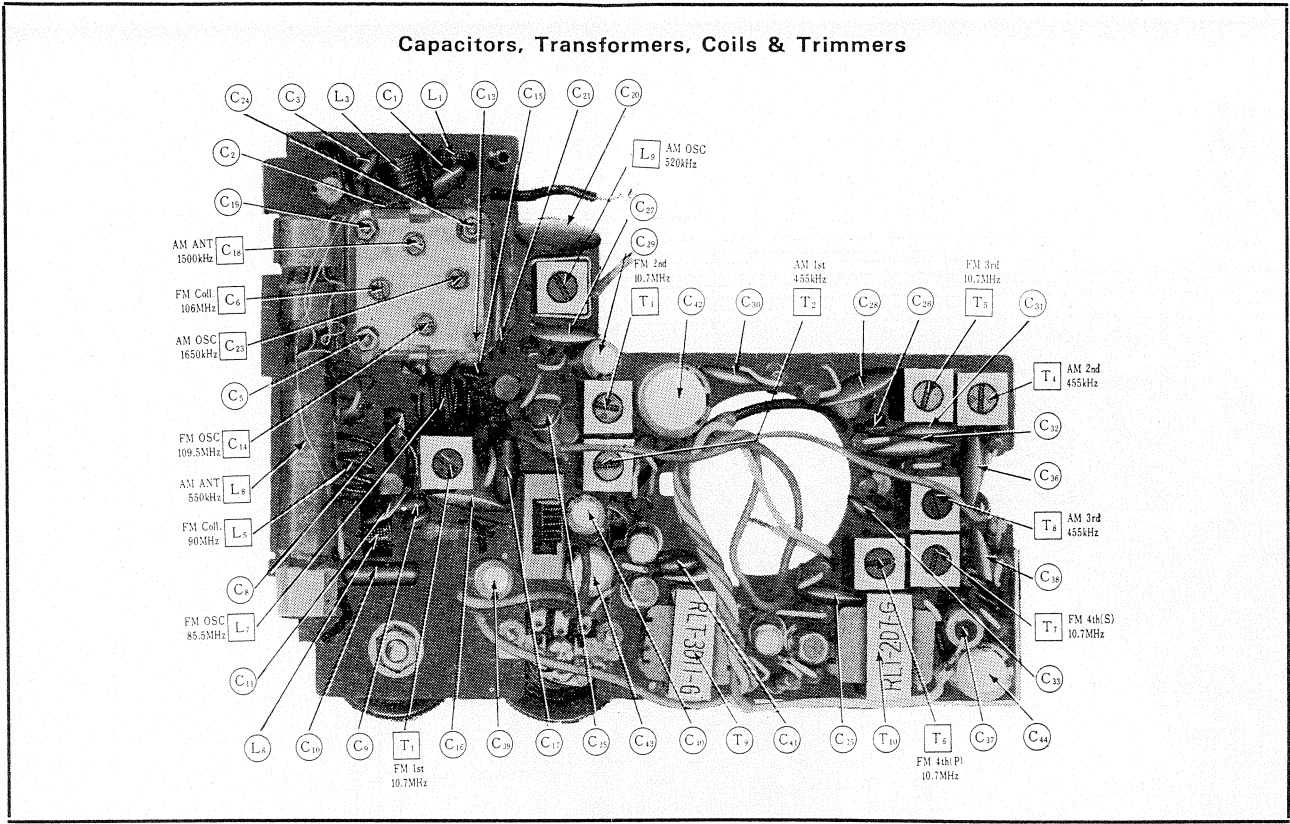


Fig. 9 Component View—Parts Identification, Alignment Points

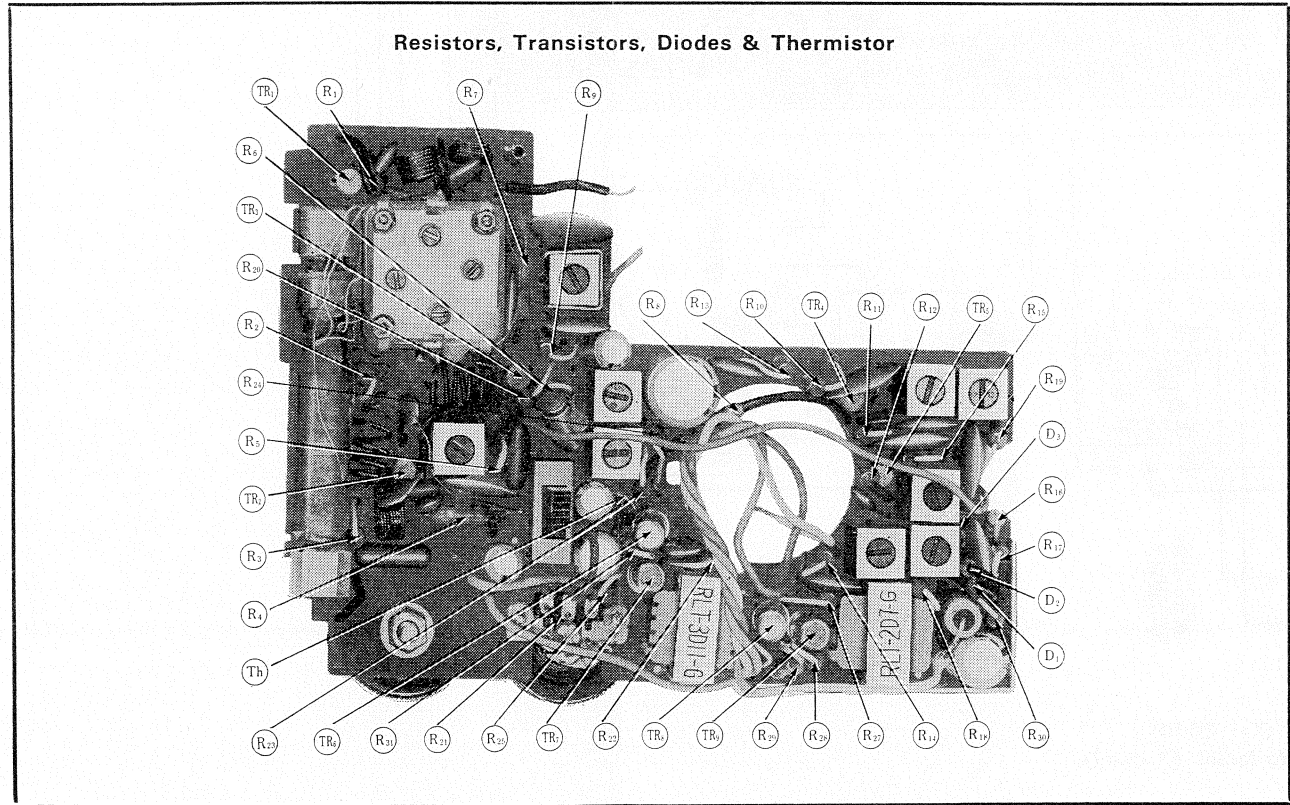


Fig. 10 Component View—Parts Identification

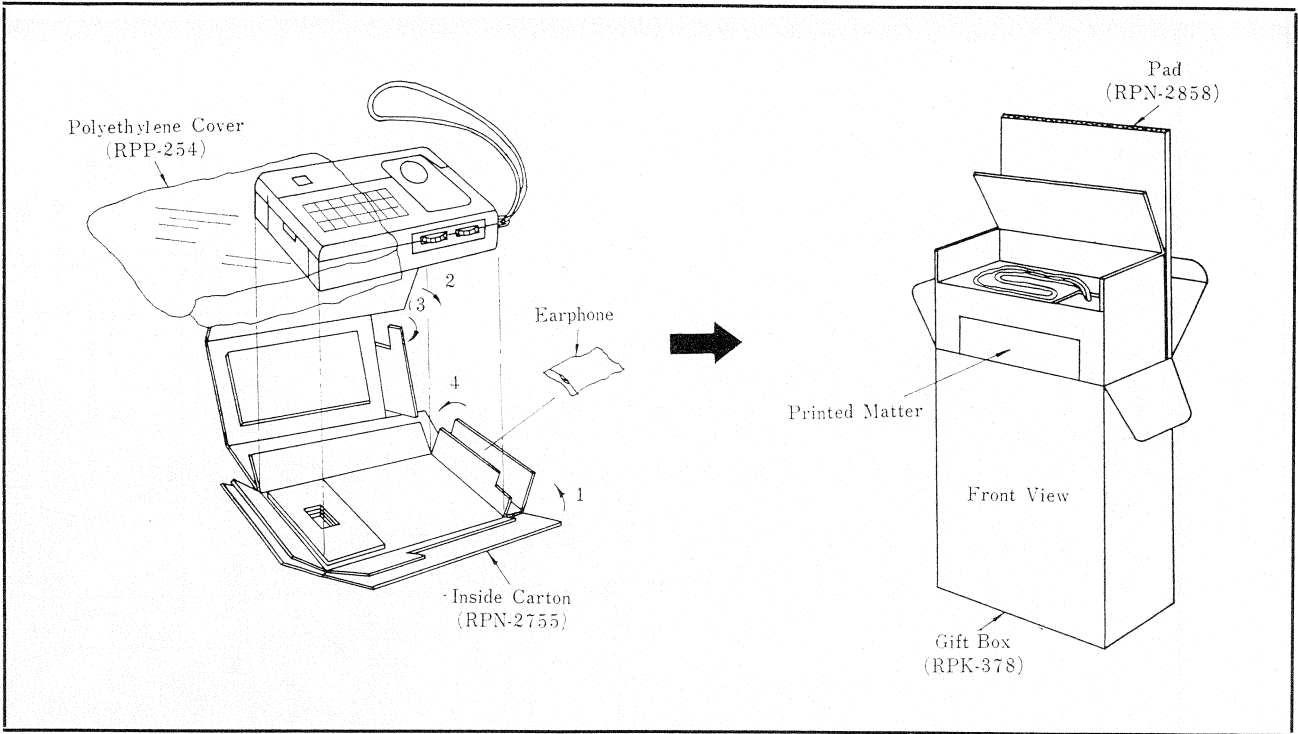
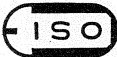


Fig. 11 Component Packing



REPLACEMENT PARTS LIST

- Notes: 1. \* indicates parts for the complete cabinet which are included when the cabinet is ordered.  
2. Part numbers are indicated on most mechanical parts. Please use this number, therefore, when ordering parts.  
3. ISO metric thread screws & parts which employ ISO metric thread screws are identified by ISO marking.

Ref. No.	Part No.	Description
TRANSISTORS AND DIODES		
TR <sub>1</sub>	2SC920	FM RF Amplifier
TR <sub>2</sub>	2SC920	FM Converter
TR <sub>3</sub>	2SC920	FM 1st IF Amp. & AM Converter
TR <sub>4</sub>	2SC829	FM 2nd IF Amp. & AM 1st IF Amp.
TR <sub>5</sub>	2SC829	FM 3rd IF Amp. & AM 2nd IF Amp.
TR <sub>6</sub>	2SB173 or 2SB111	1st AF Amplifier
TR <sub>7</sub>	2SB171 or 2SB111	2nd AF Amplifier
TR <sub>8</sub>	2SB176 or 2SB117}	Power Amplifier (push-pull)
TR <sub>9</sub>	2SB176 or 2SB117}	
D <sub>1</sub>	OA90 or 1N34A}	FM Ratio Detector
D <sub>2</sub>	OA90 or 1N34A}	
D <sub>3</sub>	OA90 or 1N34A	AM Detector & AGC
D <sub>4</sub>	OA90 or 1N34A	FM D. AGC
THERMISTOR		
Th	MT-10K	Temperature Compensator
CAPACITORS		
C <sub>1</sub>	ECM-S05560K-H	56PF, 50WV, ±10%, Mica
C <sub>2</sub>	ECC-D05030C	3PF, 50WV, ±0.25PF, Ceramic
C <sub>3</sub>	ECM-S05560K-H	56PF, 50WV, ±10%, Mica
C <sub>4</sub>	ECK-D05102P	0.001μF, 50WV, +100%, Ceramic
		— 0%,
C <sub>5</sub> , C <sub>13</sub> , C <sub>19</sub> , C <sub>24</sub> ,	PVC-2LY20T	Tuning Gang, w/Trimmer (C <sub>6</sub> , C <sub>14</sub> , C <sub>18</sub> , C <sub>23</sub> )

Ref. No.	Part No.	Description
CAPACITORS		
C7	ECC-D05120KC	12PF, 50WV, $\pm 10\%$ , Ceramic
C8	ECC-D05050CC	5PF, 50WV, $\pm 0.25$ PF, Ceramic
C9	ECC-D05390K	39PF, 50WV, $\pm 10\%$ , Ceramic
C10	ECC-D05331K	330PF, 50WV, $\pm 10\%$ , Ceramic
C11	ECC-D05120KC	12PF, 50WV, $\pm 10\%$ , Ceramic
C12	ECK-D05102P	0.001 $\mu$ F, 50WV, $+100\%$ , Ceramic - 0%
C15	ECC-D05150KC	15PF, 50WV, $\pm 10\%$ , Ceramic
C16	ECK-E05103MY	0.01 $\mu$ F, 50WV, $\pm 20\%$ , Ceramic
C17	ECM-S05221J-H	220PF, 50WV, $\pm 5\%$ , Mica
C20	ECK-E05103MY	0.01 $\mu$ F, 50WV, $\pm 20\%$ , Ceramic
C21	ECK-E05103MY	0.01 $\mu$ F, 50WV, $\pm 20\%$ , Ceramic
C22	ECC-D05050CC	5PF, 50WV, $\pm 0.25$ PF, Ceramic
C25	ECQ-S02152KZ	1500PF, 25WV, $\pm 10\%$ , Styrol
C26	ECM-S05470K-H	47PF, 50WV, $\pm 10\%$ , Mica
C27	ECK-E05103P	0.01 $\mu$ F, 50WV, $+100\%$ , Ceramic - 0%
C28	ECK-E05103MY	0.01 $\mu$ F, 50WV, $\pm 20\%$ , Ceramic
C29	ECE-A6V10	10 $\mu$ F, 6.3WV, Electrolytic
C30	ECK-E05103MY	0.01 $\mu$ F, 50WV, $\pm 20\%$ , Ceramic
C31	ECK-E05103P	0.01 $\mu$ F, 50WV, $+100\%$ , Ceramic - 0%
C32	ECK-E05333P	0.033 $\mu$ F, 50WV, $+100\%$ , Ceramic - 0%
C33	ECM-S05470K-H	47PF, 50WV, $\pm 10\%$ , Mica
C34	ECK-D05102P	0.001 $\mu$ F, 50WV, $+100\%$ , Ceramic - 0%
C35	ECK-E05103P	0.01 $\mu$ F, 50WV, $+100\%$ , Ceramic - 0%
C36	ECK-E05223P	0.022 $\mu$ F, 50WV, $+100\%$ , Ceramic - 0%
C37	ECE-B10V4R7	4.7 $\mu$ F, 10WV, Electrolytic
C38	ECK-E05103P	0.01 $\mu$ F, 50WV, $+100\%$ , Ceramic - 0%
C39	ECA-F25VR1	0.1 $\mu$ F, 25WV, Electrolytic
C40	ECA-G16ER33	0.33 $\mu$ F, 16WV, Electrolytic
C41	ECQ-G05223MZ-N	0.022 $\mu$ F, 50WV, $\pm 20\%$ , Polyester
C42	ECE-A10V220	220 $\mu$ F, 10WV, Electrolytic
C43	ECE-A6V33	33 $\mu$ F, 6.3WV, Electrolytic
C44	ECE-A10V33	33 $\mu$ F, 10WV, Electrolytic
C45	ECC-D05100KC	10PF, 50WV, $\pm 10\%$ , Ceramic
C46	ECC-D05020C	2PF, 50WV, $\pm 0.25$ PF, Ceramic
C48	ECK-E05103MY	0.01 $\mu$ F, 50WV, $\pm 20\%$ , Ceramic
RESISTORS		
R1	ERD-14TK 153	15K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R2	ERD-14VK 270	27 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R3	ERD-14VK 102	1K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R4	ERD-14TK 474	470K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R5	ERD-14VK 470	47 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R6	ERD-14VK 334	330K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R7	ERD-14TK 332	3.3K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R8	ERD-14TK 221	220 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R9	ERD-14VK 473	47K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R10	ERD-14VK 471	470 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R11	ERD-14VK 101	100 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R12	ERD-14TK 274	270K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R13	ERD-14VK 101	100 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R14	ERD-14VK 101	100 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R15	ERD-14VK 272	2.7K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R16	ERD-14VK 562	5.6K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R17	ERD-14VK 102	1K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R18	ERD-14VK 103	10K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R19	ERD-14VK 472	4.7K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R20	ERD-14VK 472	4.7K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R21	EVL-A2BT10D53	5K $\Omega$ (D), Volume Control, w/ON-OFF Switch (S <sub>3</sub> )
R22	ERD-14VK 273	27K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R23	ERD-14VK 682	6.8K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon

**MODEL RF-619**

Ref. No.	Part No.	Description
<b>RESISTORS</b>		
R24	ERD-14VK 221	220 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R25	ERD-14TK 681	680 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R26	ERD-14VK 101	100 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R27	ERD-14VK 183	18K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R28	ERD-14VK 183	18K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R29	ERD-14VK 220	22 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R30	ERD-14VK 102	1K $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
R31	ERD-14VK 560	56 $\Omega$ , $\frac{1}{4}$ Watt, $\pm 10\%$ , Carbon
<b>COILS AND TRANSFORMERS</b>		
L1	RLQ-Y25S-5	FM Choke Coil
L2	RLQ-Y10S-5	FM Choke Coil
L3	RLQ-Y75S-5	FM Choke Coil
L4	RLQ-Y10S-5	FM Choke Coil
L5	RLD-4Y45	FM Collector Coil
L6	RLQ-Y75S-5	FM Choke Coil
L7	RLQ-4Y44	FM Oscillator Coil
L8	RLF-2I30-O	AM Antenna Coil
L9	RLQ-2B48-M	AM Oscillator Coil
T1	RLI-4B152-M	FM 1st IF Transformer
T2	RLI-2B152-M	AM 1st IF Transformer
T3	RLI-4B351-M	FM 2nd IF Transformer
T4	RLI-2B157-M	AM 2nd IF Transformer
T5	RLI-4B351-M	FM 3rd IF Transformer
T6	RLI-4B551-M	FM 4th IF Transformer, Primary
T7	RLI-4B552-M	FM 4th IF Transformer, Secondary
T8	RLI-2B457-M	AM 3rd IF Transformer
T9	RLT-3D11-G	Input Transformer, P=8K $\Omega$ :S=4K $\Omega$
T10	RLT-2D7-G	Output Transformer, P=600 $\Omega$ :S=8 $\Omega$
<b>SPEAKER AND EARPHONE</b>		
SP	EAS-6P75SG	6cm (2 $\frac{1}{4}$ ") PM Dynamic Speaker, 8 $\Omega$
EP	EAE-1FB	Magnetic Earphone, 8 $\Omega$
<b>SWITCH</b>		
S1, S2	RSS-139	Band Selector Switch
<b>MISCELLANEOUS</b>		
	RJJ-61	Jack, Earphone & EXT Speaker
	*RUS-163	Spring, Chassis M'tg.
	RUL-408	Bracket, Strap M'tg.
	RMS-54	Bracket, Speaker M'tg. (2 req'd)
	RMA-266	Bracket, Core Antenna M'tg. (2 req'd)
	RDS-306	Spring, Dial
	RDZ-05-3	Cord, Dial, 50cm (20")
	RDE-74S	Shaft, Tuning $\phi 2.0$
	NN-3S	Nut, Tuning Shaft M'tg. $\phi 1.50$
	RDD-33-1	Drum, Dial
	*RJK-9101	Case, Battery
	*RJB-19-2	Connector, Battery
	RUP-4990	P.C. Board, Speaker
	*RUL-409	Bracket, Battery Case M'tg.
	*RJT-750-1	Bracket, Whip Antenna
<b>APPEARANCE</b>		
	RYA-4381	Cabinet (complete)
	*RYM-841	Cabinet Front (complete)
	*RYF-721	Cabinet Back Cover (complete)
	XEAR3K82GA	Whip Antenna
	$\phi$ B2-5N	Screw, Whip Antenna M'tg. (2 req'd)
	RBV-141	Knob, Volume
	FC1-4N	Screw, Volume Knob M'tg.
	*RKH-102	Strap, Cabinet
	*RMX-254	Washer, Strap M'tg.
	RKD-5490	Scale, Dial
	RBT-172	Knob, Tuning